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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/840,146	05/06/2004	Helmut Horst Tews	2004 P 51343 US	7404

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EXAMINER	
RAO, SHRINIVAS H	

ART UNIT	PAPER NUMBER
2814	

DATE MAILED: 07/14/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	10/840,146	TEWS ET AL.	
	Examiner	Art Unit	
	Steven H. Rao	2814	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *24 April 2006*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *5-18* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☐ Claim(s) *5-18* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

Priority

A request for continued examination under 37 CFR 1.114, including the fee set forth in 37 CFR 1.17(e), was filed in this application after final rejection. Since this application is eligible for continued examination under 37 CFR 1.114, and the fee set forth in 37 CFR 1.17(e) has been timely paid, the finality of the previous Office action has been withdrawn pursuant to 37 CFR 1.114.

Applicant's submission filed on May 03, 2006 has been partially entered.

The instant Application is a RCE of the divisional application of U.S. serial No. 09/408,248 (now U.S. Patent No. 6,740, 555) filed on September 29, 1999. A divisional application has been established with an earliest filling date of September 29, 1999.

Information Disclosure Statement

No further IDS after the one filed on May 06, 2005 has been filed in this case.

Preliminary Amendment

Applicants' amendment filed on March 23, 2006 has been entered to the extent stated below, on May 03, 2006 after the filling of the RCE.

Therefore claims 5 and 6 as amended by the amendment and claims 7 to 16 as previously recited and also recited in the amendment of May 03, 2006 are currently pending in the Application.

Claims 1-4 have been cancelled.

Specification

Applicants' proposed amendment to the specification e.g. . specification page 2para 0005, page 3 para 0011, page 4 para 0013, page 5 para 0017, page 7 para 0021 etc. have not been entered because of new matter issue/s as explained below.

Claim Rejections - 35 USC § 112

The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

Claims 5 to 16 rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the written description requirement.

The claim(s) contains subject matter which was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, had possession of the claimed invention.

Claims 5,6 and claims depending therefrom (7-18) i.e. all pending claims are rejected for claiming subject matter that was not described in the specification in such a way as to reasonably convey to one skilled in the relevant art that the inventor(s), at the time the application was filed, specifically Applicants' recite " said trench having sidewall portions perpendicular to said surface " , "first sidewall portions of said trench. disposed in a first one of the different crystallographic planes- said first plane perpendicular to

said surface; " and "second sidewall portions of said trench disposed in a second one of the different crystallographic planes said second plane also perpendicular to said surface; " , which is not taught by specification as originally filed.

The specification as originally filed describes

"Referring now to FIG. IA, a semiconductor structure 10, is shown.

The structure 10 includes a single crystal silicon substrate 12 having from in a upper surface 14 thereof a trench 16. Here, the substrate 12 is P type doped silicon. The upper surface 14 is here disposed in the <100> crystallographic plane of the silicon substrate 12. The trench 16 is a generally oval shape in the plane of the upper surface 14, as will be described in more detail in connection with FIG. 2A. Suffice it to say here, however, that because of the oval shape, shown dotted in FIG. 2A, it follows therefore that sidewalls 18 of the trench 16 are disposed in a number of different crystallographic planes, the most significant planes under consideration here are the <100> and <110> planes as . shown in FIG. 2A by the hexagonal approximation to the oval shaped periphery of the trench 12. " (applicants' specification page 3 lines 18 to 30). (emphasis supplied) .

Therefore the Examiner could not find any description what so ever of sidewall 18 of trench 16 said trench having sidewall portions perpendicular to said surface, in the specification (including drawings) as originally filed.

In fact because of the oval shape of the trench in shown fig. 2A and describes at least in the section of the specification reproduced above , the only conclusion is that there is no description what so ever of sidewall 18 of trench 16 said trench having

sidewall portions perpendicular to said surface in the specification (including drawings) as originally filed.

Applicants' reliance on their drawings(as originally filed) (without specifying which drawings in the response filed on March 23, 2006) and (identified as figs. 1A To 1E in the response filed on April 24, 2006) as support for the recitation said trench having sidewall portions perpendicular to said surface is not persuasive because in fact the figures 1A-1E, etc. are silent in its description regarding trench having sidewall portions perpendicular to said surface in the specification and similarly fig. 2A only mention that the trench is oval shaped and sidewalls 18 of the trench 16 are disposed in a number of different crystallographic planes, the most significant planes under consideration here are the <100> and <110> planes as . shown in FIG. 2A by the hexagonal approximation to the oval shaped periphery of the trench 12.

Therefore applicants' specification clearly not describing the sidewall portions perpendicular to said surface , Applicants' mere assertion that their figures shows the sidewall portions perpendicular to said surface contrary to their own description is not sufficient evidence to show that this is not new matter.

Further , Applicants' attempt to amend the specification in the current amendment (i.e faxed on April 24, 2006 pages 2-6) wherein the word " vertical" is specifically attempted to be added is conclusive proof that the specification as originally filed including the drawings did not disclose the claim limitation of "said trench having sidewall portions perpendicular to said surface" .

Therefore the above-mentioned portions of claims 5-6 and dependent claims 7 to 18 are not entered.

For response to Applicants' arguments that the not entered vertical sidewall portions as the distinguishing feature over the applied prior art see section below.

Claim Rejections - 35 USC Section 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action.

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains.

Patentability shall not be negatived by the manner in which the invention was made.

Claims ,5-18 are rejected under 35 U.S.C. 103(a) as being unpatentable over Allison (U.S. Patent .NO. 4,047,195 herein after Allison) as previously applied and further in view of Hwang et al. (U.S. Patent No. 4,833,516, herein after Hwang).

With respect to claim 5 Allison describes a single crystal semiconductor body comprising a trench formed in a surface of said single crystal semi conductor body, (Allison col.3 lines 35-37) said trench having sidewall portions (perpendicular to said surface –see below) being disposed in different crystallographic planes of the body (Allison fig. 5 # 32,33) first sidewall portions of said trench disposed in a first one of the

different crystallographic planes, said first plane perpendicular to said surface (Allison fig.5) a first layer of silicon di oxide material grown on said first sidewall potions at a first material and to a first thickness when subjected to a thermal oxidation process, (Allison co!.4 lines 5-10, Hwang co1.3 lines 10-2Q) .

Allison does not specifically describes a second sidewall portions of said trench disposed in a second crystallographic plane, and said second plane also perpendicular to said surface .

However Hwang a patent from the same field of invention describes in figure 4 and col.3 lines 20-42 describes sidewall portions in at least 100 and 110 crystallographic planes and said second plane also perpendicular to said surface to better control the growth of the epitaxial layer to desired thickness which in turn provides a better device made by a simpler process.

Therefore it would have been obvious to one of ordinary skill in the art at the time of the invention to include Hwang's a second sidewall portions of said trench disposed in a second crystallographic plane and said second plane also perpendicular to said surface in Allison's device. The motivation to make the above combination is to better control the growth of the epitaxial layer to desired thickness which in turn provides a better device made by a simpler process. (Hwang col.3 lines 10 to 42).

The remaining limitations of claim 5 :

a second layer of silicon dioxide grown on said second sidewall portion at a second rate and on said first layer of said silicon dioxide material at a rate slower than said second rate wherein said first and second sidewall portions of the trench (Allison

col.4 lines 30-35, Hwang col.3) are subjected to a thermal oxidation process such that the thickness of said second layer of silicon dioxide on said second sidewall portions is substantially equal lo the thickness of both said first and second layers of silicon dioxide on said first side portions.

The recitation , " (said trench wall having) sidewall portions perpendicular to said surface " is considered new matter for reasons set out above and not given patent able weight .

It is noted that Hwang (the applied secondary reference) in figures 4-12 , etc. shows sidewall (plane 100 portion) being perpendicular to said surface.

The recitation , "are subjected to a thermal oxidation process such that the thickness of said second layer of silicon dioxide on said second sidewall portions is substantially equal lo the thickness of both said first and second layers of silicon dioxide on said first side portions." Is taken to be a product by process recitation for which patentable weight cannot be given in the presently recited device claims. See in re Fessman, 180 U5PQ324,326(CCPA 1974); In re Marosi et al. 218 U5PQ289,292 (Fed. Cir. 1983) and particularly In re Thrope 227 USPQ964, 966 (Fed. Cir. 1985) see also MPEP 2113.

With respect to claim 6 Allison describes a single crystal semiconductor body comprising: a trench formed in a surface of said single crystal semiconductor body having sidewall portions perpendicular to said surface and disposed in different crystallographic planes of-said semiconductor body : a relatively thin material formed on selected sidewall portions (Allison 5g.5 #18, col.2 lines 2 65-68, Hwang of said trench

residing in a first one of said different crystallographic planes perpendicular perpendicular to said surface , a layer of silicon di oxide grown over said relatively thin material at a first rate by a thermal l oxidation process to a selected thickness', and said silicon dioxide grown at a second rate during said thermal oxidation process on unselected sidewall surface portions of-said trench without said thin material and said unselected sidewalls residing in a second one of said different crystallographic planes that is also perpendicular to said surface , (see rejections under claims land 5 above) said second rate faster than said first rate such that the resulting thickness of said silicon dioxide grown over both the selected sidewall portions and the unselected sidewall portions is substantially uniform (Allison col.4 lines 30-35, figures 5,8- Hwang fig. 4, etc.)

With respect to claim 7 Allison describes a semiconductor body of claim 5 wherein said first sidewall portions are disposed in the <1 10> crystallographic plane and said second sidewall portions are disposed in the <100> crystallographic plane. (Hwang figure 4, etc.)

With respect to claim 8 Allison describes the semiconductor body of claim 6 wherein the relatively thin material is silicon nitride . (well known in the ad e.g. Haung reference in Applicants' IDS).

With respect to claim 9 Allison describes the semiconductor body of claim 6 further comprising another layer of silicon di oxide formed on said relatively thin material such that said another layer of silicon dioxide and said layer of silicon dioxide grown over said relatively thin material have a combined thickness substantially the same as

the thickness of said layer of silicon dioxide grown on said unselected surface portions of said semiconductor body . (rejected for reasons set out under claim 5 above) .

With respect to claim 10 Allison describes the semiconductor body of claim 6 wherein the relatively thin material is less than 20 angstroms . (Allison col.4 lines 30-43).

With respect to claim 11 Allison describes the semiconductor body of claim 6 wherein the relatively thin material forms a layer which is thinner than the corresponding oxide layer grown on the selected and unselected surface portions. (Allison col.4 lines 30-35, figures 5-8- equal thickness on side walls).

With respect to claim 12 Allison describes the semiconductor body of claim 6 wherein said first sidewall portions are dispersed in the <110> crystallographic plane and said second sidewall portions are disposed in the <100> crystallographic plane. (Hwang figure 4 ,etc.)

With respect to claims 13 to 15 Allison describes the semiconductor body of claims 1,5 and 6 wherein said trench is oval shaped. (Allison figures, Hwang figs,)

With respect to claims 16 and 18 Allison describes the semiconductor body of claim 1 wherein said trench comprises a capacitor in a lower portion and a FET in an upper portion to form a DRAM cell. (Hwang col. line 20, line 30-31, col.2 lines 23-25).

With respect to claim 17 Allison describes the semiconductor body of claim 5 wherein said trench comprises a capacitor in a lower portion and a FET in an upper portion to form a DRAM cell.(Allison figures Hwang figs. 1, 12 and col.2 lines 23-25).

Response to Arguments

Applicant's arguments filed March 23, 2006 and April 24, 2006 have been fully considered but they are not persuasive for set out at length above and incorporated here by reference .

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Steven H. Rao whose telephone number is (571)272-1718. The examiner can normally be reached on 8.00 to 5.00.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Fahmy Wael can be reached on (571) 272-1714. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

Steven H. Rao

Patent Examiner

July 06 2006